

**CLAIMS:** I claim:

**1.** In a device for producing quantum effects, comprising:

- (a) a material fashioned into an elongated fiber shape, as in a wire, ribbon, or optical fiber
- (b) one or more control paths which carry energy along said fiber
- (c) quantum dots, whether particles, devices, or other types, on or near the surface of the fiber, which trap and hold a configuration of charge carriers based on the energy or energies in said control paths, thus forming artificial atoms

whereby said fiber can serve as a substitute for quantum dots and quantum wires in existing and future applications, and

whereby the electrical, optical and possibly other properties such as magnetic, mechanical, and chemical properties of said fiber can be manipulated through adjustment of the energies in the control paths, and

whereby said fiber can be embedded inside a bulk material, to serve as a programmable dopant which is capable of altering the electrical, optical and possibly other properties of said material in real time based on the energies in said control paths, and

whereby a plurality of said fibers can be woven, braided, or otherwise arranged into two- or three-dimensional structures, creating materials whose characteristics are electrically or optically programmable in real time by means of the energies in said control paths.

**2.** The device of Claim 1 wherein said control paths are electrical wires, whether conductors, semiconductors, or superconductors, which carry electrical voltages

**3.** The device of Claim 1 wherein said control paths are optical fibers carrying light or laser energy.

4. The device of Claim 1 wherein said control paths are radio frequency or microwave antennas.
5. The device of Claim 1 wherein the quantum dots are quantum dot particles
6. The device of Claim 1 wherein the quantum dots are quantum dot devices

7. In a method for controlling dopants in the interior of bulk materials, comprising:

- (a) confining charge carriers in a dimension smaller than the de Broglie wavelength of said carriers, such that the carriers assume a quantum wavelike behavior in all three dimensions
- (b) carrying electrical or other energy through conduits to said carriers while embedded in a solid material, without said energy directly contacting said material except through said carriers

whereby said carriers form configurations such as artificial atoms, which are capable of serving as programmable dopants to alter the electrical, optical, and possibly other properties such as magnetic, mechanical, and chemical properties, of said material in real time, and

whereby a plurality of said methods can be combined, creating a means for producing materials whose electrical, optical, and possibly other properties such as magnetic, mechanical, and chemical properties can be adjusted in real time.

8. The method of Claim 6 wherein the means of confining said charge carriers is a plurality of quantum dot particles or quantum dot devices, and said conduits are consolidated into fibers to which said quantum dot particles or quantum dot devices are attached.